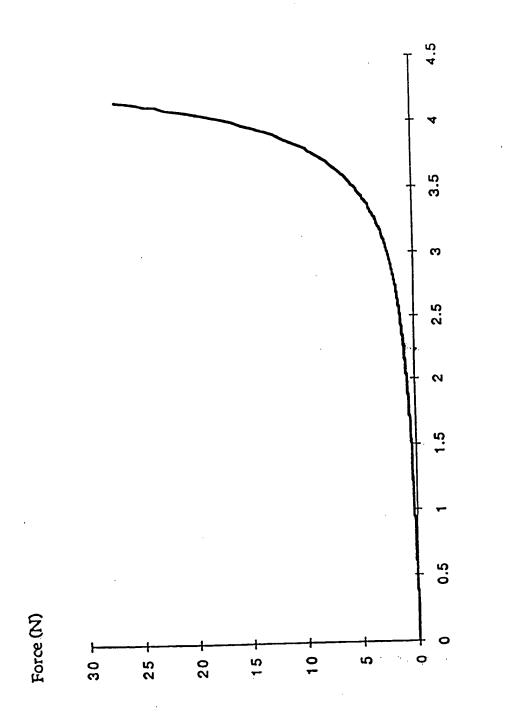
Compression of 5 mm disk (5 mm diameter) at 2 mm/min

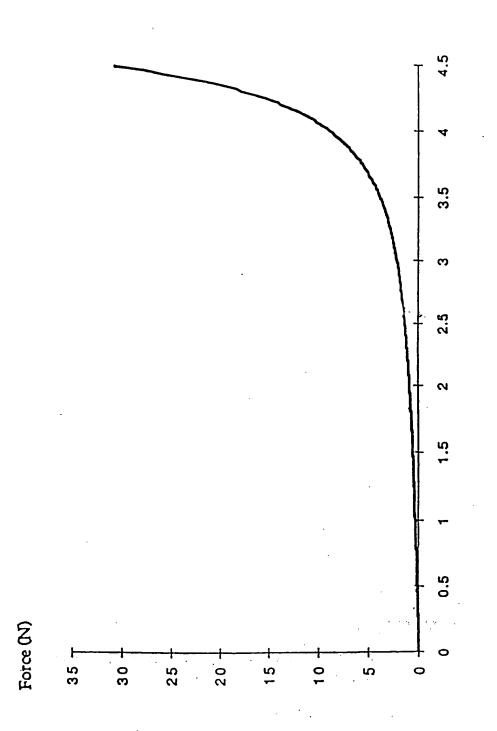


Displacement (mm)

Fig. 2

Displacement (mm)

Compression of 5 mm disk (5 mm diameter) at 2 mm/min



Diamine

Fig. 3a

Triamine

Fig. 3b

SG-PEG: Tetrafunctionally Activated PEG Succinimidyl Glutarate

(COCH ₃),N-O-CO-(CH ₃),-CO-O-(CH ₂ CH ₂ O),-CH ₂ CH ₂ -O-(CH ₂ CH ₂ O),-CO-(CH ₂),-CO-O-N(COCH ₃)),	CH3-CH2-C-CH2-C-CH2CH3	(COCH ₂) ₃ N-O-CO-(CH ₂) ₃ -CO-O-(CH ₂ CH ₂ O), CH ₂ -O-(CH ₂ CH ₂ O), CO-(CH ₂) ₃ -CO-O-N(COCH ₃),	+ Multi-amino PEG	→	***PEG-HN-CO-(CH ₂) ₃ -CO-O-(CH ₂ CH ₂ O) ₃ -CH ₂ CH ₂ -O-(CH ₂ O) ₃ -CO-(CH ₂) ₃ -CO-NH-PEG*** \	CH3-CH3-C-CH2-O-CH3-C-CH3CH3	VVV) 3d FIN CO (110) CO (1 110) C
сосн,),N-0-со		coch,),N-o-cc			^^^PEG-HN-CC	-	· 24

SE-PEG, m=3: Tetrafunctionally Activated PEG Succinimidyl Butylate (Ether Linkage)

Lichio), -CH, CH ₂ -O-(CH ₂ CH ₂ O), -(CH ₂), -CO-O-N(COCH ₃), CH ₃ O, -CH ₃ -C-O-N(COCH ₃), CH ₃ O, -CH ₃ -C-CH ₃ -C-CH ₃ CH ₃ O,	COCH ₃), -CO-O-IV(COCH ₃), -CO-O-IV(COCH ₃),	Multi-amino PEG	→	CH ₂ -O-(CH ₂ CH ₂ O),-(CH ₂),-CO-NH-PEG^^^ /	сн,-сн,-с-сн,-с-сн,-сн,-	_	CH ₂ -O(CH ₂ CH ₂ O),-(CH ₂),CO-NH-PEG^^^
(COCH ₂) ₂ N-O-CO-(CH ₂) ₃ -O-(CH ₂ CH ₂ O) ₄ -CH ₃ CH ₃ -C-CH ₂ -C-CH ₂ -O-(CH ₃ -CH ₂ O) -CH ₃ -C-CH ₂ -C-CH ₂ -C-CH ₃ -O-(CH ₃ -CH ₂ O) -CH ₃ -CH ₃ -O-CO-(CH ₃) ₄ -O-CO-(CH ₃ -O-(CH ₃ -O) -CH ₃ -CH ₃ -O-CO-(CH ₃ -O-(CH ₃ -O) -CH ₃ -CH ₃ -O) -CH ₃ -CH ₃ -O-CO-(CH ₃ -O-(CH ₃ -O) -CH ₃ -CH ₃ -O-CO-(CH ₃ -O) -CH ₃ -O-CO-(C		+		^^^PEG-HN-CO-(CH ₂) ₃ -O-(CH ₂ CH ₂ O),-CH ₂	CH,-CH,-C-CH,		^^^PEG-HN-CO-(CH2),-O-(CH ₂ CH ₂ O),-CH ₂

SE-PEG, m=2 Tetrafunctionally Activated PEG Succinimidyl Butylate (Ether Linkage)

CH₂-O-(CH₂CH₂O),-(CH₂),-CO-O-N(COCH₃), CH2-O-(CH2CH1O),-(CH1)2-CO-O-N(COCH1)1 сн,-сн,-с-сн,-о-сн,-с-сн,сн, (COCH₃)₃N-O-CO-(CH₂)₃-O-(CH₂CH₂O)₄-CH₃ (COCH₃),N-O-CO-(CH₃),-O-(CH₂CH₂O),-CH₃

CH2-O-(CH2CH2O),-(CH3),-CO-NH-PEG^^^ CH2-O(CH2CH2O),-(CH2)2CO-NH-PEG^ Multi-amino PEG CH,-CH,-C-CH,-O-CH,-C-CH,CH,) ^^^PEG-HN-CO-(CH₂)₂-O-(CH₂CH₂O)_n-CH₂ ^^^PEG-HN-CO-(CH₂)₂-O-(CH₂CH₂O),-CH₂

SE-PEG, m=1 Tetrafunctionally Activated PEG Succinimidyl Acetate (Ether Linkage)

CH₂-O-(CH₂CH₂O),-CH₂-CO-O-N(COCH₂)₂ CH2-O-(CH2CH2O),-CH2-CO-O-N(COCH1), СН,-СН,-С-СН,-О-СН,-С-СН,СН, (COCH,),N-O-CO-CH,-O-(CH,CH,O),-CH, (COCH₁)₁N-O-CO-CH₂-O-(CH₂CH₂O)₁-CH₂

Multi-amino PEG

)

^^^PEG-HN-CO-CH₂-O-(CH₂CH₂O),-CH₂

CH₂-O-(CH₂CH₂O),-CH₂-CO-NH-PEG^^^

CH₃-CH₂-C-CH₂-C-CH₂-C-CH₂CH₃

^^^PEG-HN-CO-CH₂-O-(CH₂CH₂O),-CH₂

CH2-0(CH2CH2O),-CH2CO-NH-PEG^^^

^^^PEG-HN-CO--(CH₂)₂-CO-NH-O-(CH₂CH₂O)₆-CH₂

SSA-PEG, m=2: Tetrafunctionally Activated PEG Succinimidyl Succinamide

(COCH ₃),N-O-CO-(CH ₃),-CO-NH-O-(CH ₂ CH ₂ O),-CH ₂	CH ₂ -O-(CH ₂ CH ₂ O),-NH-CO-(CH ₂) ₂ -CO-O-N(COCH ₃) ₁
	/
 CH3-CH3-C-CH3-C-CH3-C-CH3-C-CH3-CH3-CH3-	г-с-сн,сн,
,	
(COCH ₁),N-0-CO-(CH ₁) ₂ -CO-NH-O-(CH ₂ CH ₂ O),-CH ₂	CH ₂ -O-(CH ₂ CH ₂ O) _n -NH-CO-(CH ₂) ₂ -CO-O-N(COCH ₁) ₂
	Multi-omino DEG
→	
^^^PEG-HN-CO(CH ₂) ₂ -CO-NH-O-(CH ₂ CH ₂ O) ₄ -CH ₂	CH ₂ -O-(CH ₂ CH ₂ O) _n -NH-CO-(CH ₂) ₂ -CO-NH-PEG^^^
	/
CH3-CH3-C-CH3-C-CH3-C-CH3-C-CH3-C-CH3-C-CH3-CH3	1,-с-сн,сн,
^^^PEG-HN-CO(CH ₂) ₂ -CO-NH-O-(CH ₂ CH ₂ O),-CH ₂	CH2-O-(CH2CH2O),-NH-CO-(CH2)2-CO-NH-PEG^^^

^^^PEG-HN-CO-O-(CH₂CH₂O),-CH₂

SC-PEG, m=0: Tetrafunctionally Activated PEG Succinimidyl Carbonate

CH₂-O-(CH₂CH₂O),-CO-O-N(COCH₂), CH₂-O-(CH₂CH₂O),-CO-O-N(COCH₁)₁ CH₃-CH₂-C-CH₂-O-CH₂-C-CH₂CH₃ (COCH₁)₁N-O-CO-O-(CH₂CH₂O)_n-CH₂ (COCH₁)₁N-O-CO-O-(CH₂CH₂O)_n-CH₂

CH2-O-(CH2CH2O),-CO-NH-PEG^ CH2-O-(CH2CH2O),-CO-NH-PEG^* CH3-CH2-C-CH2-O-CH2-C-CH3CH3 Multi-amino PEG ^^^PEG-HN-CO-O-(CH2CH2O),-CH2

A-PEG: Tetrafunctionally Activated PEG Propion Aldehyde

CH₂-O-(CH₂CH₂O),-CH₂CHO CH2-O-(CH2CH2O),-CH2CH2-CHO СН,-СН,-С-СН,-О-СН,-С-СН,СН, CHO-CH₂ CH₂-O-(CH₂CH₂O)_n-CH₂ CHO-CH2CH2-O-(CH2CH2O),-CH2

+ Multi-amino PEG

^^^PEG-NH-CH,-CH,CH,-O-(CH,CH,O),-CH,

CH₂-O-(CH₂CH₂O),-CH₂ CH₂-CO-NH-PEG^^ CH₂-O-(CH₂CH₂O),-CH₂-CH₂-CO-NH-PEG^^ СН,-СН,-С-СН,-О-СН,-С-СН,СН,

^^^PEG-NH-CH,-CH, CH1-O-(CH1CH2O),-CH1

E-PEG: Tetrafunctionally Activated PEG Glycidyl Ether

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СН ₂ -0-(СН ₂ СН ₂ 0),-СН ₂ -СН-0-СН ₂	CH,-CH,-C-CH,-O-CH,-C-CH,	\ СН ₂ -0-(СН ₂ СН ₂ О),-СН ₂ -СН-О-СН ₂	Multi-amino PEG	→
СН,-0-СН-СН,-0-(СН,СН,О),-СН,	CH,-CH,-C-CH,-C	/ CH ₂ -0-CH-CH ₂ -0-(CH ₂ CH ₂ O) ₄ -CH ₂	+	

CH₂-O-(CH₂CH₂O),-CH₂-CH(OH)CH₂-NH-PEG^^^ CH1-CH2-C-CH2-O-CH1-C-CH1CH1 ^^^PEG-NH-CH, (OH)CH-CH,-O-(CH,CH,O),-CH,

^^^PEG-NH-CH1 (OH)CH-CH1-O-(CH1CH1O),-CH1

CH₂-O-(CH₂CH₂O),-CH₂-CH(OH)CH₂-NH-PEG^^^

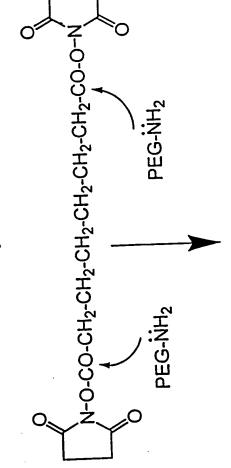
I-PEG: Tetrafunctionally Activated PEG Isocyanate

CH ₂ -O-(CH ₂ CH ₂ O),-CH ₂ -NH-CO-NH-PEG	^^^PEG-NH-CO-NH-CH ₂ -O-(CH ₂ CH ₂ O),-CH ₂
сн,-сн,-с-сн,-с-сн,сн,	O-7-CH3-C-0
/	
CH ₂ -O-(CH ₂ CH ₂ O),-CH ₂ -NH-CO-NH-PEG^^^	^^^PEG-NH-CO-NH-CH ₂ -O-(CH ₂ CH ₂ O),CH ₂
→	
Multi-amino PEG	+
\ CH ₂ -O-(CH ₂ CH ₂ O),-CH ₂ CH ₂ -N=C=O	/ 0=C=N-CH ₂ CH ₂ -O-(CH ₂ CH ₂ O),-CH ₂
-с-сн,сн,	CH,-CH,-C-CH,-C-CH,-C-CH,CH,
/	
CH ₂ -O-(CH ₂ CH ₂ O),-CH ₂ CH ₂ -N=C=O	0=C=N-CH, CH2-O-(CH2CH2O),-CH2

V-PEG: Tetrafunctionally Activated PEG Linylsulfone

CH ₂ O-(CH ₂ CH ₂ O),->O ₂ -CH = CH ₂ CH ₂ CH,	CH2,O-(CH2CH2O),-SO2-CH=CH2	Multi-amino PEG	↓ CH,0-0-(CH,CH,0), -SO,-CH,CH,-NH-PEG^^^ /	CH ₃ -CH ₂ -C-CH ₂ -C-CH ₂ CH ₃ / / \ CH ₂ O-O-(CH ₂ CH ₂ O), -SO ₂ -CH ₂ CH ₂ -NH-PEG^^^
CH ₁ =CH-SO ₁ -O-(CH ₂ CH ₂ O),-CH ₂ CH ₂ O-(\ \ CH ₃ -C-CH ₂ -C-CH ₂ -C-CH ₂ -C-CH ₃ CH ₃	/ / / CH ₂ -CH-SO ₂ -O-(CH ₂ CH ₂ O),-CH ₂	+	^^^PEG-NH-CH ₂ CH ₂ -SO ₂ -O-(CH ₂ CH ₂ O),-CH ₂	CH3-CH2-C-CH / /***PEG-NH-CH2CH3-SO2-O-(CH2CH2O),-CH2





PEG-HN-CO-CH₂-CH₂-CH₂-CH₂-CH₂-CO-NH-PEG

Dithiobis(succinimidylpropionate) (DSP)

PEG-HN-CO-CH₂-CH₂-S-S-CH₂-CH₂-CO-NH-PEG

Fig. 15

Bis(sulfosuccinimidyl) Suberate (BS³)

NaO₃S
$$O$$
 SO₃Na O N-O-CO-CH₂-CH₂-CH₂-CH₂-CH₂-CH₂-CO-O-N O PEG- \dot{N} H₂

PEG-HN-CO-CH₂-CH₂-CH₂-CH₂-CH₂-CH₂-CO-NH-PEG

Fig. 16

Bis(2-succinimidooxycarbonyloxy)ethyl Sulfone (BSOCOES)

PEG-HN-CO-O-CH₂-CH₂-SO₂-CH₂-CH₂-O-CO-NH-PEG

Fig. 17

3,3'-Dithiobis(sulfosuccinimidyl-propionate) (DTSSP)

PEG-HN-CO-CH₂-CH₂-S-S-CH₂-CH₂-CO-NH-PEG

Fig. 18